

## APPENDIX D

# MONITORING OIL AND GAS, ROADS, WILDLIFE, RANGELAND, GROUNDWATER AND WATERSHED

To meet the objectives of the CAP, and conform with the Pinedale RMP, monitoring will be accomplished by BLM and/or required of operators (oil and gas, rancher, right-of-way applicants, etc.). Monitoring is a requirement provided for in the Code Of Federal Regulations (40 CFR 1505.2(c) and 1503.3). The regulation, in its requirements relative to NEPA and Agency Decision making, states "...A monitoring and enforcement program shall be adopted and summarized where applicable for any mitigation" (1505.2(c)).

The BLM will conduct extensive monitoring inspections of construction, drilling, and rehabilitation operations, through a compliance officer and/or interdisciplinary team, to ensure acceptable attainment of objectives. The monitoring inspections will be based upon the standards in Appendix B (Standard Practices Applied To Surface Disturbing Activities).

Specific monitoring that will be implemented includes oil and gas, wildlife, and forage.

## OIL AND GAS

Reclamation: All past, present, and future reclamation will be monitored to ensure the following goals have been met with regards to successful revegetation and restoration.

- Immediate site stabilization to limit wind and water erosion.
- Establishment of vigorous stands of desirable plant species to limit invasion by noxious weeds.
- Implementation of noxious weed control in cooperation with County Weed and Pest Control Agent.
- Establishment of vegetation consistent with livestock and wildlife needs.
- Reduction of visual contrast and enhancement of aesthetic values.

- Compliance with site-specific revegetation requirements.
- Regenerating and self-supporting vegetation.

Monitoring of a reclaimed area is a joint effort between the BLM and the operator. The BLM will inspect the site immediately after the initial seeding and the following fall for compliance with the reclamation requirements. The operator is responsible for notifying the BLM as soon as the site has met the reclamation objectives identified for the site. If the BLM agrees that the site's reclamation objectives have been met on wells where final reclamation has been completed, the operator is released from any further reclamation responsibilities. If the BLM does not feel the reclamation objectives have been met, further treatment may be prescribed. The reclamation monitoring goal for revegetation will be to adequately characterize ground cover and vegetation canopy cover, and to determine vegetation species occurrence.

This data will be compared to acceptance criteria as follows: reclamation vegetative cover is 50 percent of pre-disturbance vegetative cover at 2 years, and 80 percent of pre-disturbance vegetative cover at 5 years. Other acceptance criteria may be adopted as a result of a reclamation technical review.

Monitoring will consist of a step-point transect which will record ground and canopy cover from a minimum of 100 points in the reclaimed area. This data would be compared against acceptance criterion 2 (BLM Manual, Physical Resource Studies, 4412.14 D2 and 4).

To use acceptance criterion 1, a second transect would be run in the adjacent undisturbed vegetation recording ground and canopy cover on a minimum of 100 points. This cover data would be compared to the 2 year and 5 year pre-disturbance cover parameters.

During monitoring, species will be identified and recorded in the reclaimed area to determine the composition. This data will be compared with the species that were in the seeding requirements. Evaluations will be made of the effectiveness of the seeding effort and appropriateness of the seed mix.

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Erosion condition ratings for the reclaimed sites will also be evaluated at the same time the vegetation is monitored. This will be done by visually assessing the amounts of soil movement, surface rock, pedestaling, flow patterns, and rills (BLM's Erosion Condition Class Rating system).

### ROADS

As a continuing monitoring effort all existing access roads will be continually evaluated to determine if they are: 1) still necessary, 2) safe, and 3) whether they have erosion problems. The roads will be reclaimed or maintained as is appropriate. It will be the responsibility of the authorized users to conduct preventative and corrective road maintenance, throughout the life of their operations, on the roads permitted for their use.

### WILDLIFE

The scheduling of wildlife monitoring activities is dependent upon the implementation of habitat improvement treatments. Specific monitoring practices will be as follows:

— Mule deer distribution within the CAP area will continue to be monitored annually following the completion of the Wyoming Range Mule Deer Mortality Study. Classification will occur at a level adequate enough to obtain estimates of post-treatment mule deer densities during mid-winter. Mule deer classification activities will fall under the responsibility of the WGFD.

— At least one permanent line intercept transect with a belt transect and permanent photo points will be established within each treatment area before and after treatment implementation. From these permanent transects post-treatment estimates of browse species canopy cover, browse species density by age class, and browse species hedging classes within each treatment area will be obtained. Monitoring intensity will be at least once every 3 years. These monitoring responsibilities will be shared jointly by BLM and WGFD.

— Two permanent 0.05 acre (0.02 ha) exclosures (1 livestock exclosure, and 1 livestock and big game exclosure) will be established within the sagebrush-grassland, sagebrush-salt desert shrub, and mountain

shrub-sagebrush types within the CAP area. Within these exclosures, all of the vegetative characteristics outlined will be monitored, as appropriate, at least once every 5 years. The construction and monitoring responsibilities will be shared jointly by BLM and WGFD.

— Utilization levels within and adjacent to treated areas (key areas) will be monitored using currently accepted BLM methods. These monitoring responsibilities will be shared jointly by BLM and WGFD.

### RANGELAND

**General:** In conformance with the Pinedale RMP, monitoring studies will be installed on all "I" category allotments, and on "M" and "C" category allotments as needed. Monitoring intensity will be greater on "I" allotments than on "M" or "C" allotments.

Key areas have been identified for monitoring in this plan, but only for those pastures of North LaBarge Common and Calpet Common allotments, and then only for those pastures that lie within the CAP boundaries (see Table F-1). Key areas for the other pastures in these two allotments have been tentatively located and will be identified in forthcoming AMP revisions.

Every effort will be made to include affected and interested parties throughout the monitoring period for these allotments. Pre-season and post-season range tours are customary with BLM Range Conservationist and LaBarge Roundup Association members. Utilization and distribution problems have been identified during these range tours over the past 3 years. This information was used to identify the key areas listed in Table F-1. These tours have been very beneficial in the drafting of this plan and should be continued at least through the time that this can be declared a successful and workable plan. The grazing permittees will be invited to participate in this monitoring effort to the extent that they see fit. In addition to the permittees, the following groups have been or will be invited to participate in the monitoring effort on these allotments:

Natural Resource Defense Council (NRDC)  
Wyoming Game and Fish Department  
National Wildlife Federation  
Wyoming Wildlife Federation  
U.S. Environmental Protection Agency

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**TABLE D-1**  
**MONITORING STUDIES TO BE ESTABLISHED**

Key Area <sup>1</sup>	Legal Description of Study	Utilization	Trend
<b>CALPET COMMON</b>			
<b>Calpet Pasture</b>			
Birch Creek	LOT 9 Sec. 2 T26N, R113W	X	
Calpet	NWNW Sec. 4 T26N, R113W	X	
<b>NORTH LABARGE COMMON</b>			
<b>Hogsback Pasture - Big Mesa (SW)</b>			
Water Tank	NESW Sec. 8 T27N, R113W	X	
<b>Wildcat Canyon Pasture - Big Mesa (SE)</b>			
Bird Draw	SWNE Sec. 12 T27N, R113W	X	
<b>Dry Piney Pasture - Big Mesa (NW)</b>			
Dry Piney	NESE Sec. 32 T28N, R113W	X <sup>2</sup>	X <sup>3</sup>
<b>Yose Canyon Pasture - Big Mesa (NE)</b>			
Yose Canyon	SWSE Sec. 29 T28N, R112W	X	
<b>East Chimney Pasture</b>			
Flat Top	SWNE Sec. 4 T28N, R112W	X	
<b>West Chimney Pasture</b>			
Chimney Butte	SWNE Sec. 1 T28N, R113W	X	
<b>Cretaceous Pasture</b>			
Dry Basin	NWNE Sec. 1 T28N, R114W	X <sup>2</sup>	X <sup>3</sup>
Mountain Home	SWNE Sec. 30 T29N, R113W	X	

<sup>1</sup> Trend study areas where "Permanent Plot Transects" may be necessary.

<sup>2</sup> Utilization studies in riparian areas which involve the "Paired Plot" (utilization cage) method.

<sup>3</sup> Trend study areas where the "Green Line Riparian Monitoring Method" may be incorporated.

### Monitoring Studies

The primary studies to be established are: actual use, utilization climate, trend, and observation. The timing suggested for these studies are important but personnel and funding limitations may require some modification in the frequency of data collection. All data and photos will be kept in individual analysis files for these allotments. The collection and evaluation of the data will be a joint effort by the livestock operators and BLM.

**Actual Use:** Actual use data will reflect the actual dates and numbers of livestock grazed in a pasture or allotment. It will be obtained from the operator soon after the

use is made (e.g., after pasture changes, moving off allotment, etc.). These data are extremely important in evaluating the AMP. When used in conjunction with other data, such as forage utilization and climate, it can be useful in adjusting allotment grazing capacities.

It is also important to record other use made in the pasture or allotment. This type of use could include trespass livestock, or wildlife. It is very difficult to obtain accurate data for wildlife, but every effort must be made to record this information as it is observed, particularly if an unusually heavy concentration of animals remains in a pasture or allotment.

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All deviations from licensed use must be noted. Water hauling, water problems, death and losses, management problems, etc., should be noted on the actual use form.

**Utilization:** Utilization is defined as the percent of the current year's growth consumed by animals during a given grazing period. These data can be used in conjunction with actual use and climate data to make stocking adjustments. This will be done by comparing measured utilization rates with proper or allowable rates for a particular key species. The following methods will be used to collect forage utilization data:

1. Key Forage Plant Method for use pattern mapping.
2. Ocular Estimate by Plot and/or Height-Weight Curves for key areas.
3. Paired Plot Method for riparian areas.

Data will be gathered when livestock are moved from a pasture or allotment. Measurements may be necessary before the scheduled move date if appearances indicate that 50 percent utilization is being approached. Key species will be selected for the purpose of measuring utilization. Key species will vary substantially between key areas due to large differences in topography and elevation. Key species will be identified during the 1990 and 1991 grazing seasons. To insure consistency in measuring utilization from year to year, a permanent transect will be established in selected key areas. This transect will consist of a marker post and compass direction in which the transect will be walked from the post. This will insure that the utilization will be measured in the same area year after year.

Utilization cages will be set up in some key areas, particularly in riparian areas, to aid in determining the appearance of ungrazed plants so that a more accurate estimate of utilization can be made. Utilization data may also be collected in other areas of the allotment so that an accurate estimate of utilization allotment wide may be made.

Livestock utilization will be measured on the current standing vegetation at the end of the grazing period designated for a particular pasture. Treatments other than "Early Fall" and "Late Fall" will allow for forage regrowth prior to the end of the growing season. Spring grazing treatments will be limited to 26 days or less and substantial regrowth will occur. On most years, grasses that were grazed during the spring grazing treatments will regrow to full maturity and produce seeds. If live-

stock utilization is 50 percent of the current crop at the time livestock are removed it will be substantially less than 50 percent of the current years growth after regrowth occurs.

Although range management literature may contain a wide range of recommendations on proper degrees of grazing use, those listed in this plan are based on research and experience which indicates that most native forage plants can remain vigorous and productive if at least 50 percent of the annual forage growth remains at the end of the growing season (SCS National Range Handbook). However, in riparian areas with past utilization problems (Dry Piney Creek, Dry Basin Draw and Beaver Creek), livestock utilization will be limited to no more than 40 percent of the annual forage growth. Livestock utilization targets in all riparian zones in the CAP area will be changed from percentages of annual forage growth to stubble heights when data on these relationships become available.

**Climate:** Precipitation data will be collected from rain gauges in or near the allotments. This is currently being collected from three locations:

Calpet gauge - SESE Sec. 26 T27N, R113W  
Graphite Hollow gauge - SWSW Sec. 23 T27N, R114W  
Deer Hills gauge - NWSW Sec. 24 T30N, R113W

Temperature and precipitation data will also be obtained from the National Climatic Data Center site at Big Piney.

**Trend:** Trend data will indicate the direction of change in the general health of the range resource. These data can be used in conjunction with other monitoring data to assist in making adjustments in grazing use.

Photo points will be the primary tool for evaluating trend on this allotment. They shall be marked with a post and identified by legal description and compass bearing such that the photo can be repeatable. The purpose is to establish a photographic record that will show changes as a result of management. Closeup photographs of an established plot show the soil surface characteristics and the amount of ground surface (at a given time) covered by vegetation and litter. General view photographs present a broad view of the area. These photographs, compared with other photographs of the same site taken in later years, furnish visual evidence of vegetation and soil changes.

If high intensity trend monitoring becomes necessary, "Permanent Plot Transects" will be established in critical key areas. These transects will be established and data



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will be collected according to Wyoming Rangeland Monitoring Handbook (H-4423-1). Under the "Permanent Plot Transect" method, ten 9.6-square-foot plots will be systematically spaced along a permanently located transect. The following indicators of trend can be monitored under this method: cover, composition (by weight and cover), density, frequency, production, age class, and utilization. This method of tracking trend is very time consuming and is usually only done for monitoring a specific problem. A minimum record of change can be maintained through photographs taken of each plot at specified time intervals.

Trend monitoring in riparian areas is more time consuming than upland trend monitoring. "Permanent Plot Transects" or any of the other fixed plot methods require substantially more time for establishment and data collection in riparian communities than in upland communities. Fixed plot methods are designed to quantify small changes in plant community composition over long periods of time. Plant succession in riparian areas moves rapidly. By using a line intercept method, change can be tracked by observing changes in plant community types rather than changes to composition within a plant community.

The "Green Line Riparian Monitoring Method" is an adaptation to a technique originated for the Forest Service Intermountain Region 4, by Alma H. Winward. This method relies on identification of riparian plant community types on a pace (step) transect. It is based on the premise that, given site specific objectives, some plant communities are more desirable than others. By observing these communities over time, trend toward or away from objectives may be tracked. Riparian objectives may be defined by specifying short-term improvements utilizing a desired plant community approach.

**Observation:** Written records of what happens on an allotment are extremely important. This includes things such as droughts, trespass livestock, problems with range improvements, etc. Any item that may be important in evaluating the allotment must be documented.

In this category are also livestock operator contacts. The livestock operator is in much closer contact with the allotment than most BLM employees. BLM will work closely with the operator and record his observations to achieve an accurate evaluation of the range and management systems. Livestock operator contact will receive high priority.

## Schedule for Collecting Monitoring Data

**Actual Use:** Actual use data for livestock will be obtained from permittees by Actual Grazing Use Reports 15 days after the close of the grazing period for the allotment. Actual use may also be requested after pasture moves in the spring and summer.

**Utilization:** Forage utilization will be measured on an annual basis. Every attempt will be made to measure utilization within two weeks of the time that livestock have been removed from the pasture. Utilization measurements may be necessary before the scheduled move date if excessive use is becoming apparent.

**Climate:** The rain gauge will be read four times each year as near as possible to April 15, July 1, September 1, and October 15. National Climatic Data Center reports are published monthly and include daily temperature and precipitation data.

**Trend:** Initially, trend photos will be read at yearly intervals. After full implementation of the AMP, trend photos will be taken at the completion of each grazing cycle. If "Permanent Plot Transects" are established, they will be read at the completion of each grazing cycle initially and extended to five year cycles, if no specific problem is identified.

**Observation:** This will be an ongoing process.

**Evaluation:** At the end of each grazing cycle, after implementation of this plan, an evaluation report will be made in accordance with BLM Manual 4413. The purpose of the evaluation will be to determine the effectiveness of the plan in meeting the objectives and also to insure that the forage allocations are appropriate. If the objectives are not being accomplished, or the forage allocations are not appropriate, a change to the plan or forage allocations may be necessary.

**Key Areas:** Within the Calpet Common and North LaBarge Common allotments, potential key areas (Table F-1) and associated monitoring studies were identified during the 1989 grazing season. Alterations to the key area selection and monitoring studies will be carried out during the 1990 grazing season. Most monitoring studies will be established during the 1990 and 1991 grazing seasons (key species will be identified at this time). Additional monitoring studies may be incorporated as needed.

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### GROUNDWATER

**General:** Plans for groundwater monitoring in this area were initiated by the Riley Ridge EIS prepared for the Exxon CO2 project. The Record of Decision (1984) for that EIS called for groundwater monitoring, the exact nature of which was to be determined.

Because little was known about the area's groundwater system, BLM entered into an interagency agreement with USGS Water Resources Division in Cheyenne. Under this agreement, a base level study defining the aquifer system in the Big Piney/LaBarge area was completed in 1988 at a cost to the BLM of approximately \$50,000. The study, "Hydrogeology of the Riley Ridge-LaBarge Area, Southwestern Wyoming", included water quality data available at the time. This report, coupled with water quality data collected during permitting of Exxon's Riley Ridge project (Water Resources Technical Memorandum B710, prepared by Environmental Research and Technology, Inc.), provides background groundwater quality data and for the area. Hydrocarbon seepage suspected of being associated with oil and gas production has been discovered in several isolated locations within the Big Piney/LaBarge producing area.

Several specific areas of contamination are at or near The Hogsback, in the Hogsback Unit. This contamination was/is in the form of condensate and oil flowing with water from existing springs. Two of the seeps appear to have stopped, while one continues. Mobil, as operator, continues to monitor these seeps and contain the hydrocarbons at the surface. Mobil Oil's typing of condensate from one of the seeps determined that the hydrocarbons originated from the same source as Frontier Formation production at two Mobil wells. Typing of seep oil at another location by Exxon failed to tie seepage to any nearby production. Reports by both operators conclude that the seepage is natural. The BLM is unsure of these conclusions based on historical and geological data.

Historical data indicates one natural seep location in the Big Piney/LaBarge producing area. This seep was first documented in 1907 and was responsible for much of the initial interest in the area as an oil field. Located in the SE1/4 of Section 34, T27N-R113W, the seep lies at the center of LaBarge Field where oil production is from shallow wells drilled into the Almy/Ft. Union section. No other reports of naturally occurring surface seepage have been found. To date, no production from either the Wasatch or the Darby plate Paleozoic section has been established. These sections appear to be water bearing only. Production from shallow formations in the CAP area is restricted to the Almy/Ft. Union

Formation(s), which are the only near surface water bearing zones that are naturally hydrocarbon bearing.

Oil was also found floating on groundwater during excavation for Northwest Pipeline Company's facilities. The Wyoming DEQ is currently working with Northwest to determine the source of this contamination.

It is because of these oil seeps and contamination problems, and the fact that over 1,860 wells have been drilled here since the 1920s, that concerns have been raised. Many older wells, both producers and plugged and abandoned wells, may have deteriorating cement or casing which could result in the mixing of lower quality, high salinity waters and hydrocarbons with useable waters. Increased salinity is of particular concern in the Colorado/Green River system of which this groundwater/surface water system is a part.

**Groundwater monitoring:** As outlined in Appendix C, the BLM currently is requiring surface casing and cement through the Wasatch Formation, or isolation of other zones from the Wasatch, in an effort to protect the water bearing zones in that formation. The Wasatch is the chief source for groundwater in the area.

A groundwater monitoring program is proposed which would include the entire Big Piney/LaBarge producing area. As stated above, groundwater monitoring was called for in the Riley Ridge EIS/ROD. All operations under this program, information collected, and any contamination problems or cleanup would be coordinated with the Water Quality Division of the Wyoming Department of Environmental Quality (DEQ) and the oil and gas operators in the area (Enron, Texaco, Mobil, Chevron, Western, Exxon, and Wexpro).

Sampling would begin in the Spring of 1991 and continue for 3 years. At the end of 3 years, the program would be reviewed and modified as necessary. A report would be prepared by BLM at the end of this 3-year period to summarize the findings, discuss problems, and present recommendations for future actions.

Thirty sample sites would be included in the program. Existing water wells (Map 3) used by the oil and gas industry, and town water supplies in LaBarge, Big Piney, and Marbleton would be the main sampling sources. Based on operator-supplied information, a number of water wells which are now on pump have been selected for sampling. Spacing is such that they should provide for representative sampling of the aquifers. Sampling would concentrate on the upper aquifers of the Wasatch Formation and aquifers within the Paleozoic carbonate section of the Darby thrust plate.

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Sample collection would be the responsibility of the BLM. Samples would be collected twice yearly (May and September) and submitted for analysis. BLM would distribute the data to the operators and to the Wyoming DEQ. The data would also be made available to the public. Sampling would be in accordance with techniques outlined in Chapter 2 of Handbook on Recommended Methods for Water Data Acquisition (USGA 1980b).

Sample analysis would include the following parameters, which were chosen as the minimum necessary for adequate sampling while still being representative of the known composition of area groundwater:

- Cations (sodium, potassium, magnesium, calcium)
- Anions (chloride, sulfate, carbonate, bicarbonate)
- Trace elements (barium, chromium, iron)
- Other constituents (pH, conductivity, total alkalinity)
- Total Dissolved Solids, chemical oxygen demand).

These parameters are basic to most water quality sampling, with the exception of chemical oxygen demand (COD). COD evaluates both the organic and inorganic content of water. When used in conjunction with all sample parameters, it can give a good assessment of the presence of organic compounds (including hydrocarbons). COD would be used in place of an oil and grease measurement. It should provide a more accurate assessment of hydrocarbon contamination, and is cheaper than the oil and grease measurement.

If significant contamination is found, more extensive analysis would be required, but only in the area where it is located. The operator from whose facilities contamination is determined to originate (if this can be determined) would be responsible for source detection and cleanup in a manner determined and agreed upon by the operator(s), the DEQ, and the BLM.

Significance criteria would be based on water quality data documented in the two previously referenced documents; the USGS Water Resources Investigations Report, "Hydrogeology of the Riley Ridge-LaBarge Area, Southwestern Wyoming", and Environmental Research and Technology, Inc.'s "Water Resources Technical Memorandum B710". Map 6 from the USGS paper,

entitled Surface and ground-water quality, presents Stiff diagrams and contouring of area water quality.

This information, in conjunction with specific water quality data from Memorandum B710, would be the base from which water samples will be compared. For example, if monitoring indicates total dissolved solids (TDS) levels are well above (i.e. 500-1000 mg/l TDS) what is expected in a certain location based on the background information, significant degradation may be occurring and further analysis of that area would be considered.

Criteria for other sample parameters would also be based on the previously collected background data, which, again, is presented on Map 6 of the USGS paper and in Memorandum B710. A major departure from the expected constituent values (i.e. the major anions and cations tested for) may also be an indication that further testing is necessary. Also, if the COD exceeds 50 mg/l, significant contamination may be present. This measurement is evaluated in conjunction with other measurements to ensure that it is indicating the presence of organic contamination.

The monitoring program hopefully would add to our understanding of the area's aquifer systems. The Wasatch aquifer system includes many discrete water-bearing sand lenses separated by relatively impermeable beds. It is unknown if, or to what extent, the permeable beds are interconnected. Less is known about interconnections between porous water-bearing zones in the Paleozoic carbonates. Because the available wells are developed in various sands and carbonate sections in different formations, water quality data may indicate whether mixing of aquifers is occurring.

Mixing of aquifers is of concern due to the large number of wells which penetrate rocks bearing waters of varying quality as well as hydrocarbons. Several fields in the area produce from strata in close stratigraphic proximity to good quality aquifers (Fort Union "Almy" and Mesaverde near the Wasatch). Artificial pressure variations (e.g., water flooding), as well as natural pressure variations, can lead to aquifer mixing, especially when aquifers are breached by wellbores.

Information may also be gained about groundwater supplies which could be made available for other resource activities such as wildlife and grazing management.

BLM policy is to comply with State requirements regarding the use and protection of groundwater. Federal laws and regulations (including FLPMA and Execu-

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tive Orders) define BLM's responsibility relative to groundwater. The BLM has authority and responsibility to monitor activities so as to protect and enhance the quality of the environment. Oil and gas leasing and subsequent permitting of development have the potential to result in environmental quality problems such as groundwater contamination.

### WATERSHED

#### Baseline Monitoring

The USGS water quality gaging station on Dry Piney Creek, Sec. 27, T. 28 N., R. 113 W. was reactivated by the USGS in April, 1990, and will continue to the end of September for the next 5 years to get a temporal representation of water quality. To augment this data, the BLM, concurrent with the USGS, will sample Fogarty Creek and the upper reaches of Dry Piney Creek three

times during the field season to get a spacial representation of water quality.

A single stage sediment sampler will be installed in a small undisturbed "Order 2" watershed (a watershed with two drainages), located in T. 28 N., R. 113 W., Sections 23, 24, 25, 26, 35, and 36 (Map 11), to determine the level of sediment load indicative of an undisturbed watershed. If temporal data suggests that the sediment load has exceeded 10 percent and the BMPs are not alleviating this level, then it is possible that activity in the area will have to be reduced until the sediment load is at an acceptable level.

No surface disturbance will be allowed to take place in the control "Order 2" watershed (approximately 500 acres). This watershed is to represent an undisturbed condition, and is needed for future comparisons of BMP effectiveness. Surface disturbance in this watershed would limit the utility of the data collected.